

TAXONOMY AND ECOLOGY OF ECTOMYCORRHIZAL MACRO-
FUNGI OF GRAND TETON NATIONAL PARK

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Objectives

The broad, long-term objectives of this study are (1) to determine what species of higher fungi grow in forest, range, and pasturelands in and around Grand Teton National Park; (2) to appraise their role in the ecosystem; and (3) to prepare descriptions, keys and illustrations for the common species. These are approached simultaneously although smaller, specific segments are emphasized in different collecting seasons.

The specific objectives of the 1986 field studies were to (1) collect and annotate specimens not previously studied from the Parks; (2) collect additional descriptive data and illustrations for species found in the area earlier but inadequately annotated; and (3) obtain tissue isolates for pure cultures needed in studies of taxonomy and mineral uptake of selected species.

Data and Analysis

The unusually high rainfall throughout July and the very moist, mild weather of early September which followed a very dry August gave rise to an unusual fruiting of macrofungi, including many species not previously recorded for the area. This was particularly noticeable in low places of the shrub zone dominated by Artemisia and Potentilla among scattered Picea and Populus near the Snake River. Species not previously recorded from the study area are:

Amanita pantherinoides Murrill 86070901
Anthrocobia melaloma (Albertini & Schweinitz) Boudier 86080604
Armillaria bulbosa (Barla) Kile & Watling 86080604
Camarophyllus pratensis (Fries) Fries v. pallida Kauffman 86081001
Clavaria vermicularis Fries 86080108

Clitocybe squamulosa (Fries) Kummer v. *montana* Bigelow 86070911
Cortinarius bivelus Fries 86072506
Geastrum pectinatum Persoon 86080614
Hygrocybe konradii (Clements) Singer 86072301
 nigrescens (Quelet) Kuhner 86072811
 psittacina (Fries) Karsten 86080129
 reali (Maire) J. Lange 86080121
 sciophana (Fries) Karsten 86080122
Morchella crassistipa Snyder 86062912
Mycena amabilissima (Peck) Saccardo 86090945
Otidea alutacea (Fries) Masee 86080134
 cantharella (Fries) Ricken 86072305
Peziza repanda Persoon 86090408
Phlogiotis helvelloides (Fries) Martin 86090413
Pluteus tomentosulus Peck 86090919
Scleroderma fumosa Zeller 86070709
Stropharia squamosa (Fries) Quelet 86091502
Tarzetta cupularis (Linnaeus: Fries) Lambotte 86071401
Tricholoma albobrunneum (Fries) Kummer 86090513
 platyphyllum (Murrill) Murrill 86090312

The 25 species listed above which are new to the checklist makes a total of 680 species known from the area. Sixty-one water color paintings were made of the species collected, mostly not previously illustrated in this study.

Work continued on analysis of fungal cell wall tissue for CEC (cation exchange capacity). The completed analyses of a second set of samples from soils having different CEC from that of the first set of samples confirmed our earlier hypothesis (McKnight, Harper, & McKnight, 1985) that CEC is a species characteristic not strongly modified by local environment. Working with both ectomycorrhizal and non-mycorrhizal fungal species, a paper was prepared for publication reporting the first measurements of fungal cell wall CEC. These data show that (1) fungal cell wall CEC is a genetically determined character; and (2) fungal tissue CEC influences fungal tissue cation uptake. These facts suggest that differential growth of plants on any given site could be attributable to the particular suite of fungi associated with the plants. Knowledge of how different fungi will perform in soils having a particular CEC will be helpful in the selection of fungal species used in tailoring plants by mycorrhizal inoculation before planting.

To pursue this work further, 8 species of mostly ectomycorrhizal fungi were obtained in pure culture during the 1986 field season. Pure-culture mycorrhizae will be synthesized in the laboratory using 3 tree species and different combinations of fungal species. We will test the hypothesis that trees having mycorrhizal fungi with cell-wall CEC matching the soil CEC grow more quickly than trees having mycorrhizal fungi with cell-wall CEC that does not match the soil CEC.

Literature Cited

McKnight, K. H., K. T. Harper and K. B. McKnight. 1986 Taxonomy and Ecology of Ectomycorrhizal Macrofungi of Grand Teton National Park. In Univ. of Wy.-Natl. Park Serv. Ninth Ann. Rept., 1985, pp. 83-84.